

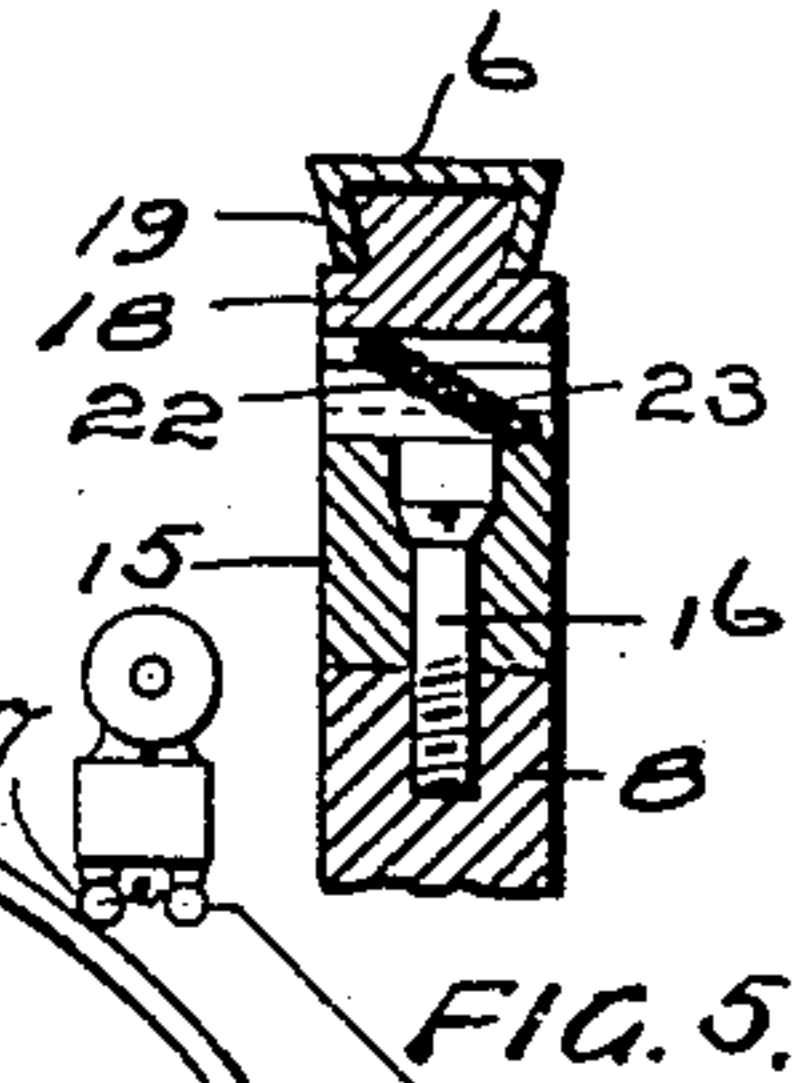
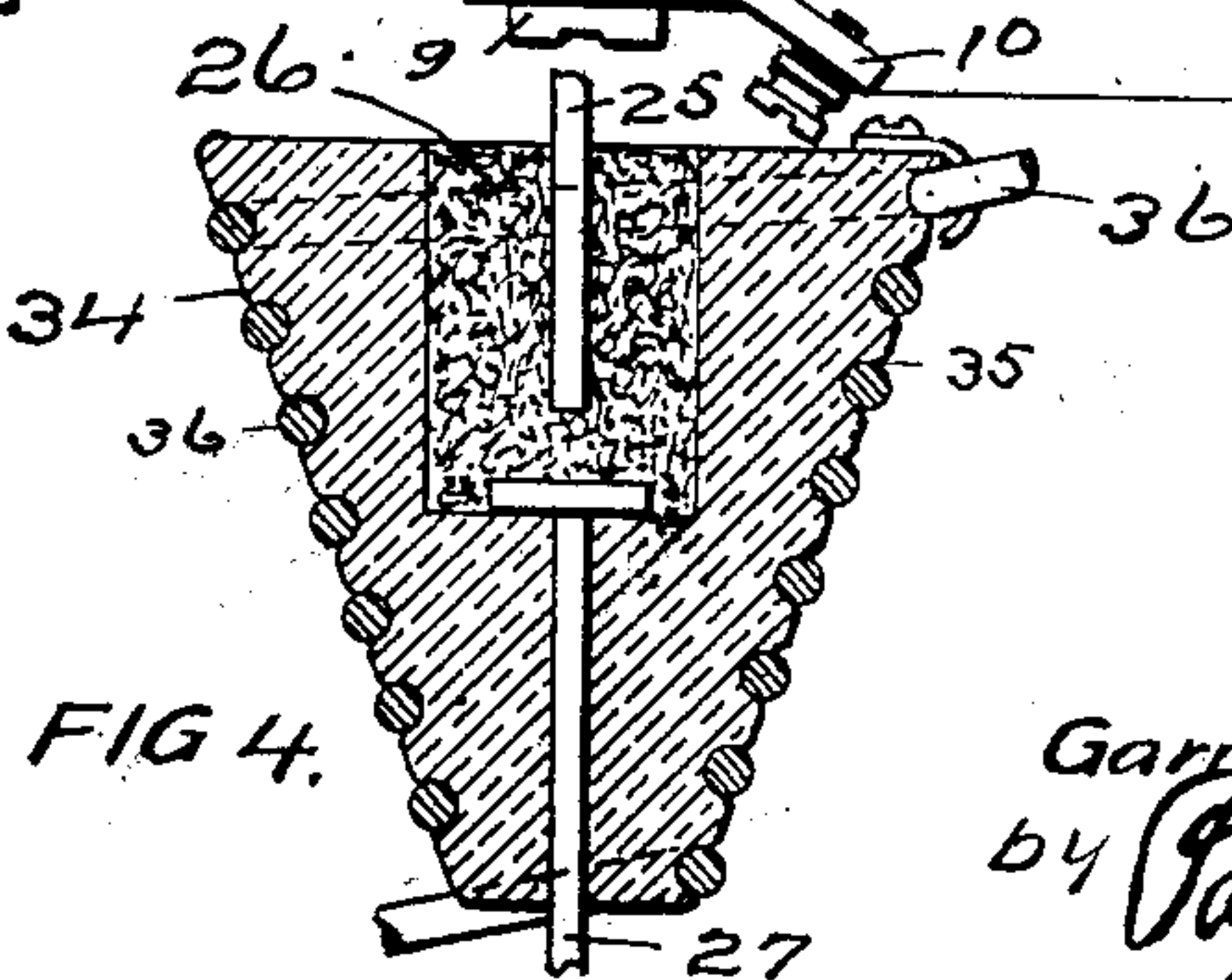
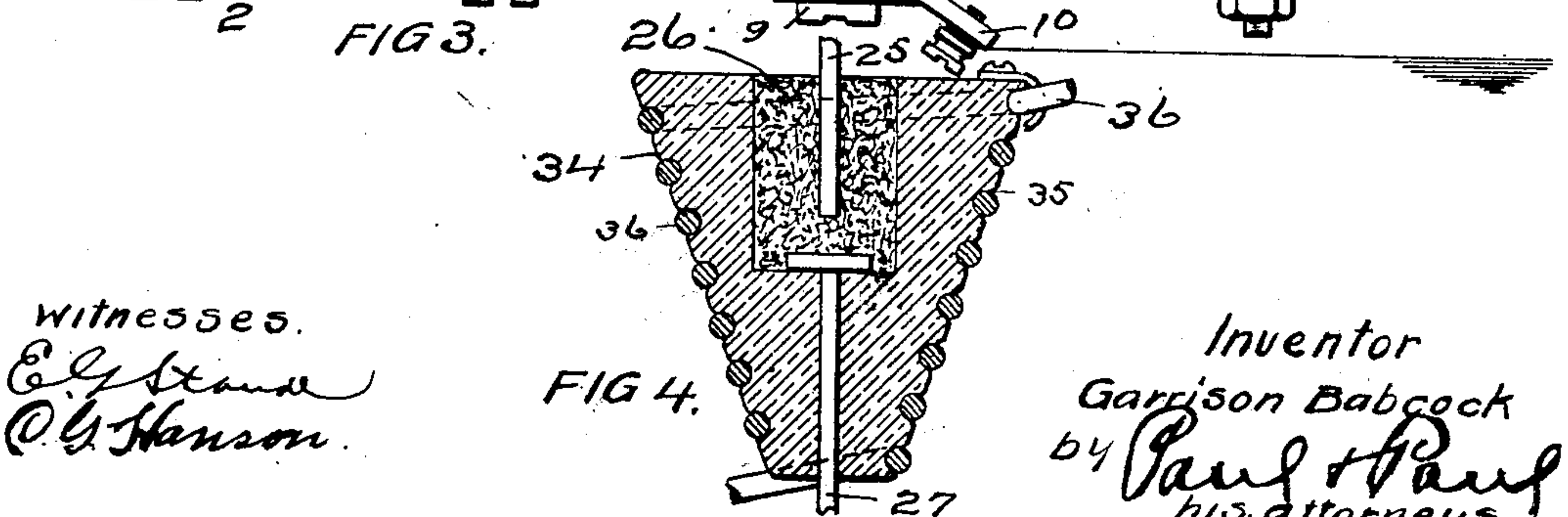
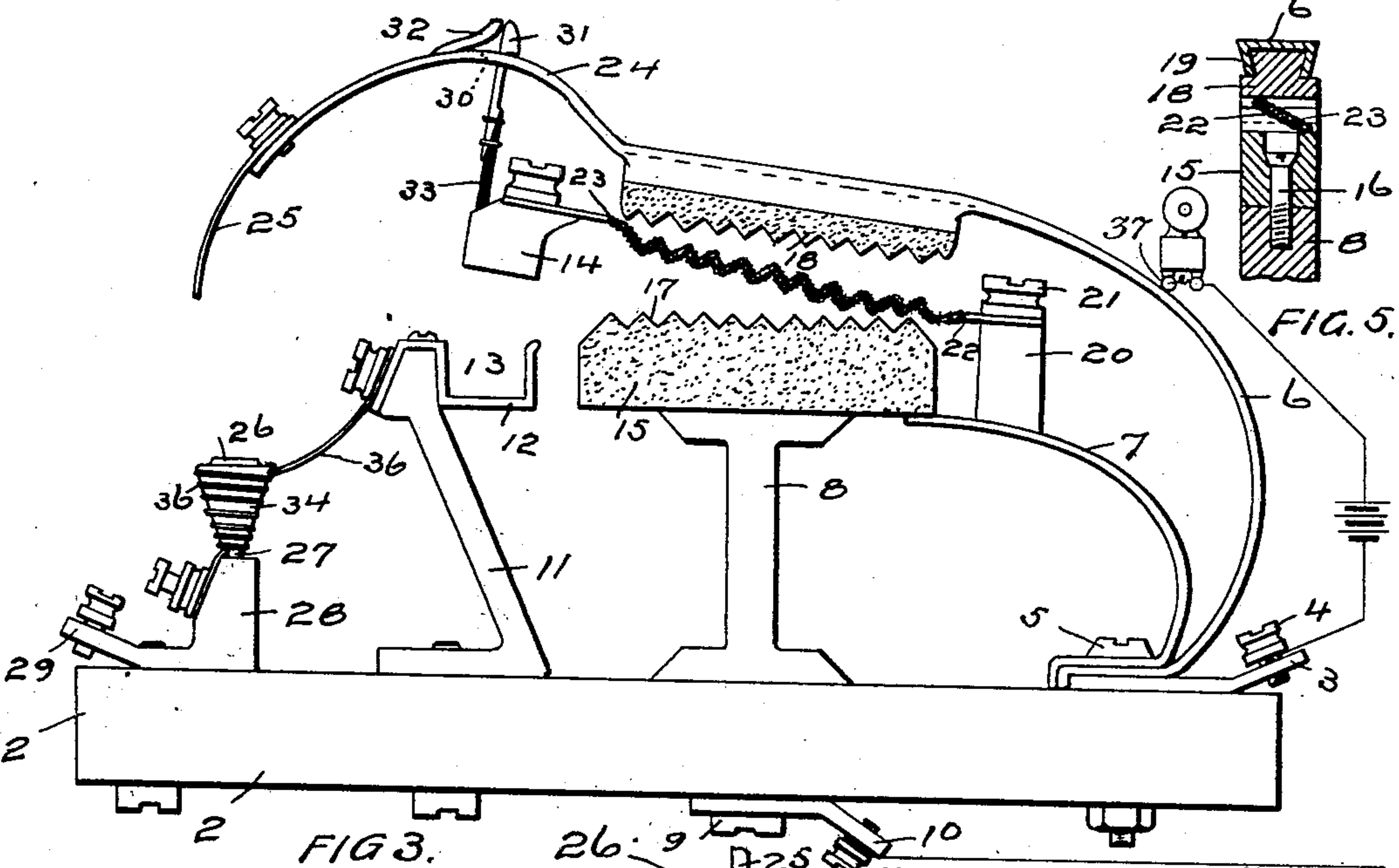
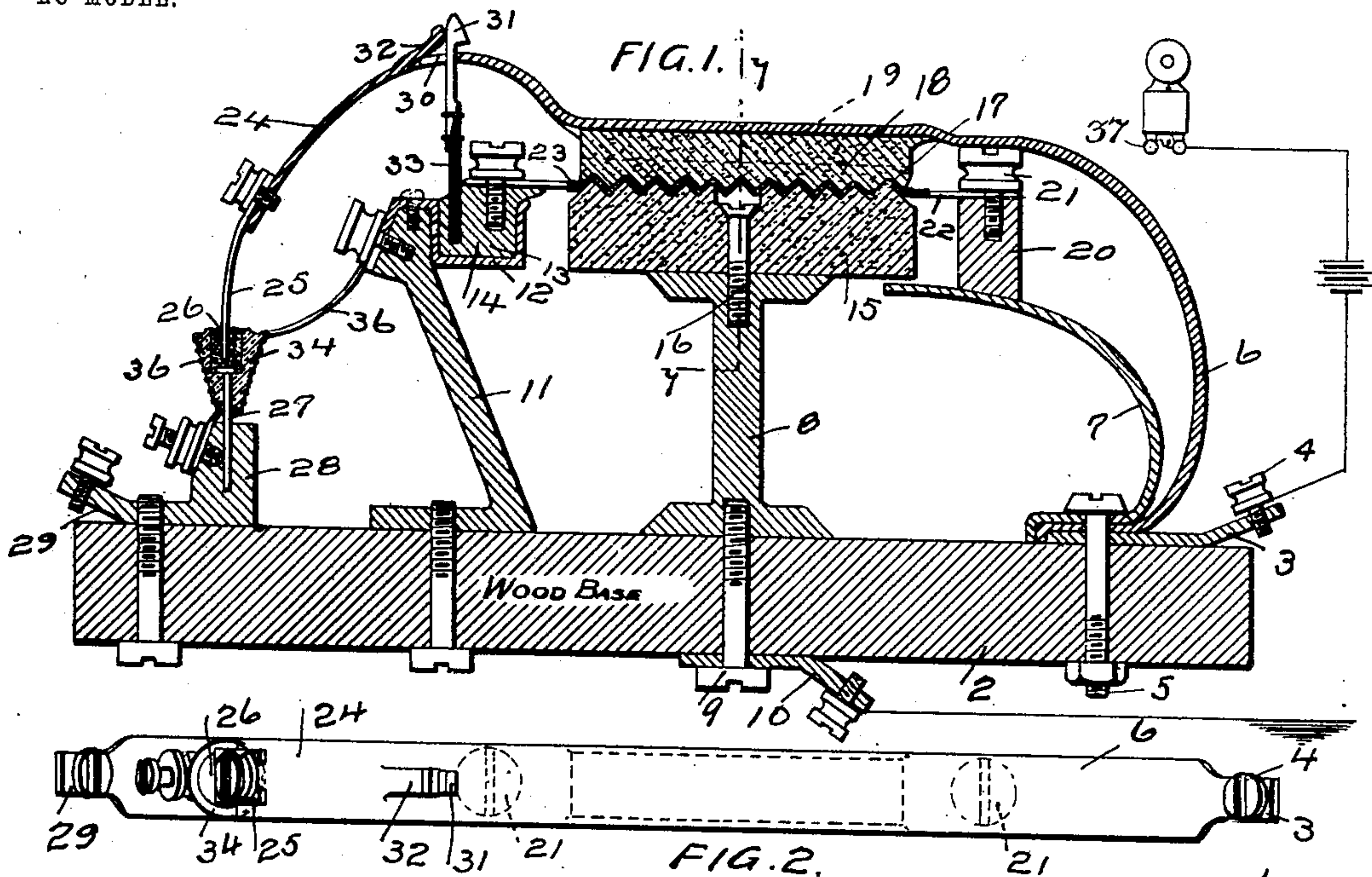
No. 763,350.

PATENTED JUNE 28, 1904.

G. BABCOCK.
LIGHTNING ARRESTER.

APPLICATION FILED SEPT. 20, 1902. RENEWED APR. 18, 1904.

NO MODEL.



Witnesses.
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UNITED STATES PATENT OFFICE.

GARRISON BABCOCK, OF CHICAGO, ILLINOIS.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 763,350, dated June 28, 1904.

Application filed September 20, 1902. Renewed April 18, 1904. Serial No. 203,802. (No model.)

To all whom it may concern:

Be it known that I, GARRISON BABCOCK, of Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Lightning-Arresters, of which the following is a specification.

My invention relates to lightning-arresters of the thermal type, designed principally for use between the line and switchboard of telephone systems, and hence called a switchboard or central-office arrester; and the object of the invention is to provide the maximum surface between the line and ground carbon plates with discharge-points.

A further object is to provide a fuse-wire between said plates having greater length and powers of retardation than those in lightning-arresters as usually constructed.

A further object is to provide means which while normally insulating the fuse-wire from the line and ground carbon plates will form a good conductor between them when the resistance-wire is fused.

A further object is to provide an improved form of heat-coil that will be more reliable and efficient in its action than those in general use.

Other objects of the invention will appear from the following detailed description.

The invention consists generally in providing line and ground plates and a fusible resistance material between them.

Further, the invention consists in plates having fluted, corrugated, or otherwise roughened contiguous surfaces, wherein the wire or other resistance material is pressed zigzag from side to side of said plates.

Further, the invention consists in providing a strip of insulating material between the resistance-wire and the surfaces of said plates, which material when the wire is fused will become carbonized and form a conductor between the surfaces of the plates.

Further, the invention consists in providing a heat-coil in the form of a block of non-conducting material, preferably glass or porcelain, around which the wire is wound, each coil being insulated and spaced from the others, thus insuring a more rapid and uniform heating of the cone.

Further, the invention consists in the various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical section of a lightning-arrester embodying my invention. Fig. 2 is a plan view thereof, the position and width of the insulated resistance or retardation wire being indicated by dotted lines. Fig. 3 is a side elevation of a lightning-arrester, showing the position of the parts after the coil has become heated and the circuit opened between the line and switchboard. Fig. 4 is a vertical section of the heat-coil. Fig. 5 is a section on line *yy* of Fig. 1, showing the manner of securing the line carbon plate.

In the drawings, 2 represents a base of suitable non-conducting material, preferably wood, provided near one end with a clip having a binding-post 4, to which the line-wire is connected, the device being designed particularly for use in telephone systems. This clip is held in place by a bolt 5, which also secures flat spring-plates 6 and 7, that are arranged one above the other in circuit with the line-wire and bent under tension toward the middle of the base, the spring 6 acting as a holder for the line carbon plate.

8 is a post or standard provided near the middle of the base, secured by a bolt 9, that supports a clip 10, to which the ground-wire is attached by a suitable binding screw or post similar to the one described.

11 is a bracket also secured to the base and carrying a spring-clip 12, that is bent to form a socket 13 for a metal block 14, that fits snugly within a rubbing contact within said socket. This rubbing of the block upon the walls of the socket keeps the metal bright and clean and insures a good contact at all times.

Upon the standard 8 I provide a plate 15, preferably of carbon, which I will hereinafter refer to as the "ground" carbon plate, secured by any suitable means, such as a screw 16, in the standard and having a series of transverse ribs, flutes, or corrugations 17 in its upper surface, which are arranged to coincide with a corresponding series in the un-

der side of a similar plate 18, which I will hereinafter refer to as the "line" carbon plate. The plate 18 is supported between guides 19, provided on the plate 6, and is adapted to be slipped in between said guides or removed therefrom for substitution or repairs. Upon the spring 7 I provide a post 20 in the line-circuit, having a binding-screw 21, which secures the line-terminal of a retardation fuse-wire 22 of soft-metal composition or German silver, as preferred, firmly to said post, the other or switchboard terminal of said wire being secured to the metal block 14 by a similar binding-screw. The free end of the spring 7 underlaps the ground carbon plate and normally is held out of contact therewith and the spring under tension by the pressure of the spring 6 on the screw 21. The wire 22 is pressed into the corrugations in the line and ground carbon plates and extending from side to side assumes a serpentine or zigzag form, which, with its increase in length over the straight wire usually employed, produces a greater retardation of a high-potential current than when a straight wire is used, and the meshing of the points or corrugations one with another insures a more perfect contact when the line is grounded through its carbon plate. The retardation-wire between the carbon plates is preferably flat in cross-section to bring the corrugated surfaces as near together as possible, and said wire is normally insulated from said plates by a covering of silk 23 or other suitable material, which, though normally a non-conductor, will when subjected to a current of sufficient intensity to fuse the wire 22 become carbonized and form a good conductor between the line and ground plates. If the line-wire should be struck by a bolt of lightning, the retardation-wire will be instantly fused, opening the circuit to the switchboard. The high-tension current will carbonize the covering 23, causing it to become a good conductor between the line and ground carbon plates. The circuit being broken to the switchboard by the fusing of the wire 22 and the circuit being normally open through the spring 6, the arm 24, and the heat-coil, as will hereinafter appear, it is evident that any subsequent trespassing current following the line will take the course of least resistance through the carbon plates and the carbonized covering to the ground, and the switchboard will be thus protected from injury. The ridges or corrugations in the contiguous surfaces of the carbon plates will present maximum surfaces between said plates of a given exterior measurement, and the edges of the corrugations in one plate meshing with those of the other will present discharge-points for conducting the electrical discharge from the line to the ground, while the greater length of the retardation-wire in comparison with the space that it occupies and its peculiar zigzag form will offer greater resistance to the

current than fuse-wires heretofore employed for this purpose.

The line-carbon-plate holder 6 is provided with a curved arm 24, to which a short section of wire 25 is attached by the usual binding-screw, above referred to, and the free end of said wire is embedded in a small block of wax 26 or similar material that will fuse at a certain predetermined temperature, preferably of 120°, said block being mounted on a pin 27, that is inserted into a metallic block 28, secured to the base 2 by a bolt similar to those described, and provided with a lug 29, having a binding-screw to which the switchboard connection is made. The arm 24 upon being drawn down to the position shown in Fig. 1 and secured will hold the line carbon plate against the covering of the retardation-wire, with the corrugations of said plate meshing with those of the ground-plate beneath and against the tension of the spring-holder or plate 6. The arm 24 is also provided with a slot 30 to receive a metallic hook 31, that is engaged by a spring-tongue 32, struck up out of said arm, preferably, and bearing upon the head of said hook. The shank of said hook is secured by loops 32 to a pin 33 of fiber or other suitable non-conducting material, whose lower end is inserted and secured within a socket in the metallic block 14. When in use, the hook 31 projects through the slot 30 a little above the arm, so that when the arm is released it travels a short distance before engaging the hook, and when such engagement occurs the tension of the spring-holder is sufficient to withdraw the metal block 14 from the spring-clip and open the circuit to the switchboard. To insure fusing the block 26, I provide an inverted block 34, preferably conical in form, of non-conducting material, preferably glass or porcelain, supported on the pin 27 and inclosing said block and having in its outer surface a series of annular grooves 35, extending around the cone from the top to the bottom thereof and wherein a bare resistance-wire 36, preferably of German silver, is wound, the line-terminal of said wire being connected to a binding-post on the clip 12 and the other terminal to a similar post on the block 28. This heat-coil device is designed particularly to protect the switchboard from injury in case the line telephone-wire should become crossed with a light or other wire conducting a current that is not of sufficient intensity to fuse the retardation-wire, as above described, but will heat the coil and cone and melt the substance that secures the line-plate holder and open the circuit to the switchboard. The coils of the wire 36 are separated from each other in the surface of the cone and when subjected to an electrical current of great intensity will heat the cone more rapidly and uniformly than is possible where the coils are bunched and in contact with each other or one laid over the other. In other words, the coil is so con-

structed that it has a uniform resistance and maximum radiation of heat from the wire, which results in even and rapid distribution of the heat throughout the cone and the immediate fusing of the block or lug inclosed thereby. As soon as the block 26 is softened sufficiently to release the arm 24 the tension of the holder-plate 6 will throw the arm up to the position shown in Fig. 3, separate the line from the carbon plate, pull the block 14 out of the spring-clip, and open the circuit to the switchboard. At the same time the spring 7 being released its free end will contact with the ground carbon plate and close the line-circuit to the ground. To sound an alarm when the circuit is opened to the switchboard, I prefer to provide a post 37, connected with a suitable alarm-circuit and in position to be engaged by the spring-plate 6 when it is released by the fusing of the block in the heat-coil.

I am aware that lightning-arresters of various kinds have been heretofore invented; but none of them, so far as I know, embody the essential features of my invention, which consist in the line and ground carbon plates having the ribbed or corrugated contiguous surfaces and discharge-points, the retardation fuse-wire pressed into the corrugations of said plates, the covering for said wire carbonized by a current of great intensity to close the circuit between said plates, and a heat-coil consisting of a hollow cone of glass or porcelain with a bare wire wound thereon, each coil being spaced from the others to cause a rapid and uniform heating of the cone.

I claim as my invention—

1. In a lightning-arrester, line and ground carbon plates having contiguous corrugated or ribbed surfaces and an insulated fuse-wire in the line-circuit between said surfaces.

2. In a lightning-arrester, line and ground carbon plates having contiguous surfaces provided with transverse ribs or corrugations, and a retardation fuse-wire pressed into said corrugations between said plates and insulated therefrom.

3. In a lightning-arrester, line and ground carbon plates having their contiguous surfaces provided with transverse ribs or corrugations, and a flat retardation fuse-wire pressed into said corrugations between said plates and insulated therefrom and having its terminals connected respectively with the line and the switchboard.

4. In a lightning-arrester, line and ground carbon plates, and a fusible wire zigzag in form provided between said plates and having its terminals connected respectively with the line and switchboard, and a covering of insulating material for said wire.

5. A safety device for electric circuits, comprising contiguous conducting-surfaces, one being grounded, a fuse interposed between said surfaces, and a material normally insulating said fuse and surfaces and adapted to be broken down and carbonized by a high-tension current to close the ground-circuit upon the destruction of said fuse.

6. A safety device for electric circuits, comprising contiguous conducting-surfaces, one being grounded, a fuse interposed between said surfaces and extending zigzag from side to side between them, and a material normally insulating said fuse and surfaces and adapted to be broken down and carbonized by a current of high potential to close the ground-circuit upon the destruction of said fuse.

7. A safety device for electric circuits, comprising contiguous conducting-surfaces provided with depressions, one surface being grounded, a fuse interposed between said surfaces and pressed into said depressions, and a material normally insulating said fuse and said surfaces, and adapted to be broken down and carbonized by a current of high potential to close the ground-circuit upon the destruction of said fuse.

8. A safety device for electric circuits, comprising plates having contiguous roughened surfaces, one of said plates having a ground connection, and a fuse-wire in the line-circuit interposed between said surfaces and insulated therefrom.

9. A safety device for electric circuits, comprising plates having contiguous roughened surfaces, one of said plates having a ground connection, and a fuse-wire interposed between said surfaces and pressed into the depressions in said surfaces and insulated therefrom.

10. A safety device for electric circuits, comprising plates having contiguous fluted surfaces, one of said plates having a ground connection, and a fuse-wire interposed between said surfaces and pressed into the flutes in said surfaces and insulated therefrom.

11. A safety device for electric circuits, comprising plates having contiguous corrugated surfaces, one of said plates having a ground connection, and a fuse-wire interposed between said surfaces and pressed into the depressions and extending zigzag from side to side of the plates therein and insulated therefrom.

In witness whereof I have hereunto set my hand this 8th day of September, 1902.

GARRISON BABCOCK.

In presence of—

IRA S. READ,
E. T. SINTON.